SUBJECT TEACHING GUIDE

G584 - Mathematical Methods in Engineering

Degree in Energy Resources Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Energy Resources Engineering			Type and Year	Core. Year 2
Faculty					
Discipline	Subject Area: Mathematics Basic Training Module				
Course unit title and code	G584 - Mathematical Methods in Engineering				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION
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Other lecturers	MARIA DOLORES FRIAS DOMINGUEZ

3.1 LEARNING OUTCOMES

- Solve non-linear equations
  - Interpolate and approximate functions and numerical data
  - Numerical integrals and derivatives
  - Use the most adequate methods to solve systems of linear equations
  - Model and solve basic scientific and technical mathematical problems
  - Efficient use of computers and a programming language to tackle problems in an engineering context
  - Model basic optimization problems of practical use in engineering
  - Identify the most adequate techniques to solve optimization problems
  - Solve linear programming problems
  - Knowledge and computation of the most important statistical measures
  - Compute probabilities of outcomes in practical problems
  - Use random variables, recognizing their value to model many practical phenomena
  - Recognize practical situations where the most common probability distributions arise

4. OBJECTIVES

The overall aim of the course is an introduction to numerical methods, optimization and statistical data analysis

Introduce the students to mathematical problem solving techniques using a computer and applied to modelling scientific and technical problems.

Use statistics to characterize the variability and quantify random processes

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction
2	Statistics
2.1	Descriptive statistics
2.2	Probability and random variables
2.3	Common probability models
2.4	Least squares regression models
3	Numerical methods
3.1	Numerical solution to non-linear equations
3.2	Numerical interpolation, integration and differentiation
3.3	Numerical solution to systems of non-linear equations
4	Optimization
4.1	Linear programming and optimization

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Cooperative programming work	Work	No	Yes	20,00
Periodic exams	Written exam	No	Yes	20,00
Final exam (theory and practical problems)	Written exam	Yes	Yes	60,00
TOTAL				100,00

Observations

The final exam is divided, as the subject, in two parts. The first exam will take place shortly after the end of the first part of the subject.

Observations for part-time students

Part-time students can take both parts of the final exam at the end of the semester. The rest of the assessment methods will take place as for the rest of the students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Chapra S. y Canale R. (2010) "Numerical Methods for Engineers". McGraw-Hill Science/Engineering/Math. <http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=332392>

Luceño, A., González, F.J. (2003) “Métodos Estadísticos para Medir, Describir y Controlar la Variabilidad”. Serv. Public. Universidad de Cantabria. <http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=214714>

Cobo, Angel (1995). “Optimización Matemática”. Ed. Angel Cobo Ortega, Univ. de Cantabria. <http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=124088>